Amendments to the Drawings

The attached sheets of drawings include Figures 1 to 4 to replace the original sheets Figures 1 to 4. In Figure 2, the reference 144 mentioned in the description has been added. In Figure 3, the references 300 and 310 have been changed to 294 and 296 respectively, thus ensuring the references do not conflict with the references in Figure 4.

Attachments: Replacement Sheets

Remarks

The present communication responds to the non-final Office Action of January 26, 2007. The Examiner objected to various referencing anomalies in the drawings and objected to various informalities in the claims, which have been amended by this communication. The Examiner further rejected claims 1-3 under 35 U.S.C 103(a) as being unpatentable over Keahey ("Nonlinear Magnification"- Indiana University – PhD Dissertation – August 1998 – 176 pages).

By this communication, Applicant has amended the drawings and claims 1-3 without adding new matter. The Applicant has further amended the claims to define the invention's patentability over the prior art.

In view of the amendments and the following remarks, reconsideration is requested.

Claim Objections

The Examiner objected to several of our claims for various informalities. The objections raised by the examiner have been addressed in the new claims. Applicants respectfully request reconsideration and allowance of the pending claims.

Claim Rejections under 35 U.S.C §103

Claims 1-3 were rejected under 35 U.S.C 103(a) as being unpatentable over Keahey ("Nonlinear Magnification"- Indiana University – PhD Dissertation – August 1998 – 176 pages) ("Keahey").

The invention as recited in the amended claims 1-3 discloses a method and system of distorting an image, particularly but not solely designed for magnifying parts of an image more than the remainder of the image. The method comprises the steps of

maintaining in computer memory a set of base data values representing an image to be subjected to a transformation function; calculating a non identity approximation of the transformation function; retrieving from computer memory one or more of the base data values; calculating an intended magnification value (M_c) for one or more of the retrieved base data values; calculating an estimated magnification value (M_s) for one or more of the retrieved base data values; storing in computer memory the estimated magnification values as a set of transformed data values representing the transformed image; calculating the difference (M_E) between the intended magnification value(s) and the estimated magnification value(s); and repeating steps (c) to (g) until M_E is less than a predefined threshold.

The Examiner has indicated that the claims of the present invention are obvious in light of Keahey. The Applicant respectfully submits that the Examiner has missed the important innovation disclosed in the claims for the present invention. The advance over the prior art is that the present invention describes starting with an approximation to the eventual best fit transformation grid, rather than using an identity transformation grid as taught by Keahey. The key step is disclosed in step 1(b) of the initial claim, and is not addressed by the Examiner. In particular, the Examiner claims that the patent is essentially a translation of Keahey's pseudo-code on page 75 of his thesis:

```
// first initialize T_C to identity transform
[ ... ]
// iterate over T_C until convergence
while(!converged)
  for(i := 1..s)
    for(j := 1..t)
      M_E(i,j) := M_S(i,j) - M_C(i,j);
      if(M_E(i,j) > 0)
        pushNeighboursAway(T_C, i, j);
      elsif(M_E(i,j) < 0)
        pullNeighboursClose(T_C, i, j);
      endif
```

While the method and system disclosed in the present invention are similar in the later steps, the first step of the algorithm would instead be:

// first initialize T_C to an approximation of the optimal transformation function

Therefore, the Applicant submits that Keahey does not teach the method of using an approximation of the optimal transformation function as claimed in the present invention, and finding a useful approximation of the optimal transformation function would not be obvious to one skilled in the art. In addition, the use of an initial approximation function in the present invention not only allows speedier computation of the optimal transformation function, but also overcomes some of the defects of Keahey's original method (i.e. the occurrence of "buckling").

The Applicant submits that this is a significant and substantial difference between the two methods, and it is significant that the Office Action does not cite a reference for claim 1(b) from Keahey's work. Therefore the Examiner's rejection of claims 1 and 3 as "obvious to one of ordinary skill in the art at the time of the invention... because this pseudo-code representation could be implemented onto a computer..." are not valid, since the invention is not simply an implementation of Keahey's pseudo-code on a computer.

Claim 2 of the invention details a particular method of constructing an approximation that can be used as an initial value for T_C. The Applicant respectfully submits that the Examiner has misunderstood this method as being an improvement to the algorithm described by Keahey, confusing the parameter p used in equation (14) of the patent application with a different and distinct variable p used in the details of Keahey's method (page 76). In equation (14), the parameter p is a power which appears in the calculation of one of many potential initial approximating transformation functions $G(p)$. On page 76 of Keahey's work, p is used as one particular value of the transformation T_C at a grid point. The Applicant submits that these are two distinct concepts, and it is well-known in mathematics that the same variable name is often re-used with different meanings in different places.

Furthermore, the Examiner has indicated that the root mean square error (RMSE) is equivalent to an "approximating function" as described in the patent. The Applicant

submits that the RMSE is in fact a *measure* of error in an approximation, not an approximation in-and-of itself.

The Examiner has indicated that the method in claim 2 involves calculating "maximal steps of Keahey's... algorithm" and since all steps are calculated by Keahey's algorithm, the finding the maximal one is obvious. The Applicant submits that this is not what claim 2 specifies. Claim 2 describes a method where many potential initial approximate transformation functions $G(p)$ defined by equation (14) are considered. These functions have a specific form which is not taught anywhere in Keahey's work. Based on knowing the desired magnification M_S, one of these approximate transformation functions is selected by comparing the maximal value of the derivative of $G(p)$ for a particular value of p with the maximal value of M_S. If this difference is below some specified value, the initial transformation that is selected is $G(p)$ (instead of the identity transformation that Keahey uses, as discussed above), otherwise a different value for p is selected and the process repeated. The Applicant respectfully submits that this is distinct from what Keahey teaches. Keahey does not teach a method of selecting an initial transformation function other than the identity, and does not teach the particular method disclosed in the present invention. Moreover, the functions $G(p)$ are complex, and the method of selecting a good one to use as an initial transformation function is not trivial. Thus, the Applicant submits that the method described would not be obvious to one skilled in the art.

In light of the Examiner's rejections and the reasons outlined above, claim 1 and 3 have been amended to further distinguish the invention over the prior art. In particular, claim 1(b) has been amended as "calculating a <u>non-identity</u> approximation of the transformation function", with analogous amendments made to claim 2 and 3. Claim 2(a) and 2(c) have been amended to read "approximating function G(p)"; and claim 2(e) and 2(g) have been amended to read "derivative of G(p)".

The Applicant respectfully submits that Keahey does not teach the claimed invention as amended.

Conclusion

For the above reasons, the Applicant submits that the specification and claims are now in proper form, and that the claims all define patentability over the prior art, for at least the reasons set forth above. Therefore we submit that this application is now in condition for allowance, which action we respectfully solicit.

Conditional Request for Constructive Assistance

Applicants have amended the specification and claims of this application so that they are proper, definite, and define novel features which are also unobvious. If, for any reason this application is not believed to be in full condition for allowance, Applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. §2173.02 and §707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Petition for Extension of Time

A Petition for Extension of Time for one (2) months has been filed herewith, with the Credit Card form, duly authorized for payment of the $225.00 fee (Small Entity status claimed).

Application No. 10/701,509 (McInnes)
Reply to O.A. of Jan 26, 2007

Respectfully submitted,

COMPUDIGM SERVICES INC.
Customer Number 37942

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Certificate of Facsimile Transmission

I certify that on the date below I will fax this communication, and any attachments, if any, to Group Art Unit 2609 of the Patent and Trademark Office at +1 571 273 8300.

Date: June 26, 2007 (US Date)

Applicant's Signature: _____